

**IN THE CLAIMS:**

1.-29. (Cancelled)

30. (Currently Amended) A system for monitoring device for use with a household electric appliance being a washing machine, the monitoring ~~device~~ system comprising:

- i. a read and write memory storing a plurality of measurements of ~~at least one~~ a plurality of physical quantity-quantities relating to the household electric appliance within a predetermined time period during a treatment cycle-, the storing of a last measured value of ~~said at least one~~ a physical quantity causing the deletion of a first measured value within said plurality of ~~values~~ measurements in the read and write memory;
- ii. a first interface means to connect to one or more sensors for measuring said plurality of at least one physical quantities of the household electric appliance, including one or more internal sensors for measuring internal physical quantities and one or more external sensors for measuring external physical quantities;
- iii. a dedicated communication network having a coupling to an external physical sensor, said network being coupled externally of the washing machine to the first interface means;
- ~~iii~~.iv. a means for measuring at least one electric quantity by measuring an electric current running through the monitoring device;
- ~~iv~~.v. a storage means containing one or more predefined values of the at least one physical quantity;
- ~~v~~.vi. a microcontroller to process a particular combination of at least one physical quantity and at least one electric quantity to determine an actual combination of the internal physical quantities, one or more external physical quantities or both and one ore more electrical quantities at an instant in time ~~of a particular set of physical and~~

27 | ~~electrical quantities~~, the microcontroller being further configured to  
28 | compare ~~that particular~~said actual combination to one or more  
29 | respective predefined values contained in the ~~non-volatile~~  
30 | ~~memory~~storage means to determine at least one piece of information  
31 | each predefined value being a threshold value against which an actual  
32 | value is compared to determine a proper operation of a particular  
33 | component of the appliance at that instant in time; and  
34 | vi.vii. a second interface means to send the at least one piece of information  
35 | to a remote center for storage.

1 | 31. (Currently Amended) The monitoring device as in claim 30, further comprising:  
2 | a wireless communication device within the first interface means, the wireless  
3 | communication device communicating with at least one internal sensor within the  
4 | household electric appliance where the at least one internal sensor measures a ~~second~~  
5 | physical quantity of an internal part of the household electric appliance; said wireless  
6 | communication device also adapted to function as the dedicated communication network  
7 | that couples the external sensors that sense the external physical quantities to said first  
8 | interface means, and further to report electrical measurements; and  
9 | the microcontroller being adapted to further process the measurements received  
10 | from the wireless communication device~~of the second physical quantity.~~

1 | 32. (Cancelled )

1 | 33. (Currently Amended) The monitoring device of claim 30, further comprising:  
2 | a timing unit, where the timing unit ~~allows an instant in~~determines time to be  
3 | associated with the measurements of the one or more physical quantities and at least one  
4 | electric quantity.

1 | 34. (Previously Presented) The monitoring device of claim 30, wherein the at least one  
2 | electrical quantity includes at least one of: momentary electric current drawn by the

3 household electric appliance, line voltage applied to the household electric appliance,  
4 momentary electric power drawn by the household electric appliance, electric energy  
5 consumption of the household electric appliance within a predefined time period, a power  
6 factor of the load represented by the household electric appliance,  $\cos(\Phi)$  of the load  
7 represented by the household electric appliance, and type of reactive power of the load  
8 represented by the household electric appliance.

1 35. (Previously Presented) The monitoring device of claim 30, wherein the first interface  
2 is connected to the one or more sensors through a wireless connection.

1 36. (Previously Presented) The monitoring device of claim 30, wherein the second  
2 interface means is connected to the remote center through a wireless connection.

1 | 37. (Currently Amended) The monitoring device of ~~claim 30~~ claim 41, wherein the  
2 household electric appliance includes one of: a clothes dryer, a washing/drying machine,  
3 a dishwasher, a refrigerator, a freezer, a refrigerator/freezer, an electric oven, a gas oven,  
4 a microwave oven, a gas cooking top, an electric cooking top, a magnetic induction  
5 cooking top, a kitchen hood, a conditioner, a gas boiler, an electric water heater, an air  
6 conditioner, a hair dryer, an iron, a Hi-Fi system, a mixer or any other electric  
7 kitchenware, a lighting device, an alarm device.

1 38. (Previously Presented) The monitoring device of claim 30, wherein said at least one  
2 physical quantity includes at least one of: temperature, flow rate, conductivity, weight,  
3 absolute humidity, relative humidity, pressure, linear displacement, linear velocity, linear  
4 acceleration, angular displacement, angular velocity, angular acceleration, chemical  
5 concentration, sound pressure, sound intensity, light intensity, oscillation frequency, and  
6 oscillation amplitude.

1 39. (Previously Presented) The monitoring device of claim 30, further comprising:

an information storage means for storing the at least one piece of information in the read and write memory.

40. (Previously Presented) The monitoring device in claim 30, wherein the household electric appliance is one of a laundry washing machine and a washing/drying machine adapted to perform at least one wash treatment on textile items, said at least one physical quantity being preferably at least one of the following: weight of the textile items being present in the basket of the washing machine or the washing/drying machine, flow rate of water supplied to the washing machine or the washing/drying machine, temperature of washing liquid contained in a tub of the washing machine or the washing/drying machine, and conductivity of the washing liquid drained by the washing machine or the washing/drying machine, where the washing liquid comprises water and at least one washing agent.

41. (Currently Amended) A monitoring device for use with a household electric appliance, the monitoring device comprising:

- i. a read and write memory storing a plurality of measurements of a of at least one plurality of internal physical quantities, a plurality of external physical quantities and a plurality of electrical quantities that are related to the household electric appliance, said measurements being taken within a predetermined time period during a treatment cycle, the storing of a last measurement of ~~said at least one~~ a physical quantity causing the deletion of a first measurement of said ~~at least one~~ physical quantity;
- ii. a first interface means to connect ~~to one or more external sensors~~ a dedicated external communications network to a plurality of external physical sensors, which measure external physical quantities, and further having means for coupling a plurality of ~~and one or more~~ internal physical -sensors for measuring ~~said at least one~~ an internal physical quantity of the household electric appliance, where the one or more internal sensors are connected to the monitoring device by way

- 18 of an electronic control means and the first interface means;
- 19 iii. a means for measuring at least one electric quantity by measuring an
- 20 electric current running through the monitoring device;
- 21 iv. a microcontroller configured to:
- 22 a) process measurements of a combination of the one or more internal
- 23 physical quantities, one or more external physical quantities, or both, and
- 24 ~~the at least one or more~~ -electric quantities to determine at least one piece
- 25 of information relating to or being employed in said treatment cycle
- 26 during operation of the household electric appliance, where the at least one
- 27 piece of information includes at least one of: functional information,
- 28 statistical information, and diagnostic information relating to the
- 29 household electric appliance by comparing a value of said ~~at least one~~
- 30 physical quantity with one or more predefined values that relate to values
- 31 for the treatment being performed by the appliance at an instant in time;
- 32 and
- 33 b) extrapolate from said plurality of measurements of said at least one
- 34 physical quantity a data packet representative of the evolution of said at
- 35 least one physical quantity within said predefined time period over one or
- 36 more treatment cycles; and
- 37 v. an information storage means for storing the at least one piece of
- 38 information in the read and write memory.

1 42. (Previously Presented) The monitoring device of claim 41, wherein the first interface

2 means is an electric cable to the one or more external sensors.

1 43. (Previously Presented) The monitoring device of claim 41, wherein the first interface

2 means is wirelessly connected to the communication means.

1 44. (Previously Presented) The monitoring device of claim 41, wherein the first interface

2 means is wirelessly connected to the one or more external sensors.

1 45. (Previously Presented) The monitoring device of claim 41, wherein the first interface  
2 means is connected to the first communication means.

1 46. (Previously Presented) The monitoring device of claim 41, wherein the  
2 communication means and the one or more internal sensors are connected through an  
3 electronic control means, where the electronic control means collects, stores, and  
4 processes the measurements from the at least one physical quantity from the one or more  
5 internal sensors.

1 47. (Currently Amended) A system for monitoring a household electric appliance, the  
2 system comprising:

3 a) a household electric appliance;

4 ~~b) one or more external physical sensors to measure ~~one or more a plurality~~~~  
5 ~~of physical external physical quantities of the household electric~~  
6 ~~appliance; being external measurements;~~

7 b) a dedicated communications network that is coupled to said external  
8 physical sensors and is connected externally from said appliance to said  
9 network which transfers information to an associated microcontroller via  
10 the first interface means;

11 ~~c) an electronic control means connected to one or more internal sensors,~~  
12 ~~where the one or more internal sensors measure one or more physical internal~~  
13 ~~quantities or one or more electrical quantities of the household electric~~  
14 ~~appliance, the electronic control means configured to collect, store, and~~  
15 ~~process measurements of the one or more physical and electrical internal~~  
16 ~~quantities being internal measurements;~~

17 ~~d) a communication means communicating with the electronic control means~~  
18 ~~to transfer ~~one or more of said external measurements and one or more of said~~~~  
19 ~~internal measurements, over a predetermined time period to a first interface~~  
20 ~~means on a monitoring device;~~

21 ~~e) c) \_\_\_\_\_ the monitoring device including:~~

- 22 a. a read and write memory storing a plurality of measurements of ~~at~~  
23 ~~least one physical quantity~~ said plurality of external physical  
24 quantities, a plurality of internal physical quantities and a plurality of  
25 electrical quantities, within a predetermined time period, the storing of  
26 a last measurement of said at least one ~~physical~~ quantity causing the  
27 deletion of a first measurement of said ~~at least one physical quantity~~;
- 28 b. the first interface means to connect to the one or more external sensors  
29 and the communication means to receive the measurements of the one  
30 or more physical external quantities and the one or more physical  
31 internal quantities;
- 32 c. a means for measuring at least one electric quantity by measuring an  
33 electric current running through the monitoring device,
- 34 d. a timing unit to associate an instant in time at which the measurements  
35 of the one or more physical quantities and the at least one electric  
36 quantity are taken,
- 37 e. a microcontroller configured to:
- 38 (i) process the measurements of the one or more physical  
39 external quantities with one or more physical internal  
40 quantities, and the at least one electric quantity, at the instant  
41 in time, to determine sensed information relating to the  
42 household electric appliance, where the sensed information  
43 includes: functional information, statistical information, and  
44 diagnostic information relating to the household electric  
45 appliance, said sensed information being a combination of  
46 values of at least one physical external quantity, physical  
47 internal quantity and at least one electric quantity with a  
48 reference combination of physical and electrical quantities  
49 being the combination that best represents the proper  
50 operation of the appliance at that instant in time, and
- 51 (ii) collect information that allows the system to trace a history

52 of the monitored electric appliance that permits the  
53 microprocessor to build in the read and write memory,  
54 profiles being indicative of a trend within a predefined time  
55 period of a particular physical quantity or typology of  
56 information obtained by the microcontroller based upon  
57 values detected by the sensors; and  
58 f. a second interface means to send the at least one piece of information  
59 to a remote center; and  
60 g. the remote center configured to collect the at least one piece of  
61 information from one or more monitoring devices connected to respective  
62 household electric appliances and to extract statistical information about  
63 the household electric appliances being monitored.

1 48. (Previously Presented) The system of claim 47, wherein the remote center receives a  
2 plurality of information sent by the monitoring device that the remote center collects and  
3 sorts for the purpose of identifying at least one parameter related to the operation of a  
4 washing machine or a washing/drying machine, the at least one parameter being  
5 preferably at least one of the following: number of wash treatments performed by the  
6 washing machine or the washing/drying machine within a predefined time interval,  
7 quantity and typology of textile items loaded on average by a user for each wash  
8 treatment, quantity and typology of washing agents loaded on average by the user for  
9 each wash treatment, average quantity of water used by the washing machine or the  
10 washing/drying machine for each wash treatment, and average electric energy absorbed  
11 by the washing machine or the washing/drying machine for each wash treatment.

1 49. (Cancelled)

1 50. (New) The system as defined in claim 30 wherein the external sensors include further  
2 comprising:

3 | a flow sensor positioned along an associated inlet pipe and adapted to measure  
4 water flow rate supplied to the washing machine; and



5           a conductivity sensor positioned along a drain pipe adapted to measure the  
6           conductivity of washing liquid drained from the washing machine.

1 | 51. (New) A system for monitoring a washing machine, comprising  
2           a microcontroller configured to receive measurements from sensors associated  
3           with the washing machine;  
4           a flow sensor positioned along an associated inlet pipe externally to said washing  
5           machine and adapted to measure water flow rate supplied to the washing machine;  
6           a conductivity sensor positioned along a drain pipe adapted to measure the  
7           conductivity of washing liquid as the liquid drains from the washing machine;  
8 |           a dedicated communication network having a coupling to the flow sensor  
9           and the conductivity sensor, said network being coupled externally of the  
10           washing machine to the microcontroller; and  
11 |           a read and write memory storing a plurality of measurements of at least one  
12           physical quantity relating to the washing machine's operation, to provide a historical  
13           analysis of the operation of the washing machine.